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State of Connecticut

# REPORT

OF THE

## New Haven Harbor Development Commission

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*PUBLISHED BY AUTHORITY OF THE  
STATE BOARD OF CONTROL*

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1922



State of Connecticut *Department of Commerce*  
*New Haven 1922*

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New Haven, Connecticut,  
October 1, 1922.

To His Excellency, EVERETT J. LAKE,  
Governor of Connecticut, and the General Assembly,  
Hartford, Connecticut.

Sir:

The New Haven Harbor Development Commission has the honor to submit its report as required by the Act of the General Assembly creating the Commission. The Act is as follows:

AN ACT CONCERNING NEW HAVEN HARBOR  
DEVELOPMENT COMMISSION

*Be it enacted by the Senate and House of Representatives in General Assembly convened:*

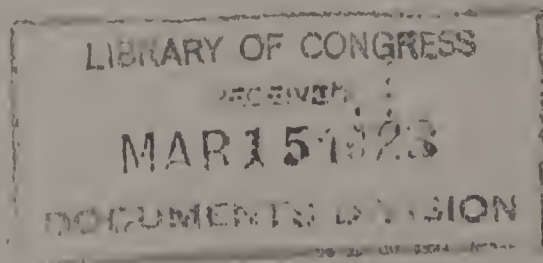
SECTION 1. On or before July 1, 1921, the governor shall appoint a commission to be known as the development commission of New Haven Harbor, which shall be composed of five members, at least two of whom shall be electors of the city and town of New Haven, and at least one an elector of the town of Orange; all of whom shall serve without compensation.

SECTION 2. Said commission shall inquire into and, on or before October 1, 1922, present a report, *addressed to the governor and the general assembly*, upon the facilities of New Haven harbor, making such recommendations as may be deemed advisable for the future development thereof with a view to the prompt and efficient handling of passengers and all classes of freight, the construction of permanent works and the probable expense thereof. Said commission shall also inquire into and report upon the question of the aid of such project by the federal government and the amount, if any, to be available.

Approved, June 3, 1921.

Empowered by this Act, Your Excellency appointed the following commissioners:

Charles G. Bill, of Hartford;  
Waldo E. Clarke, of New London;  
Frederick L. Ford, of New Haven;  
Edward Gagel, of West Haven; and  
George Dudley Seymour, of New Haven.



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## REPORT OF THE COMMISSION

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The Commission held its first meeting at New Haven on October 5, 1921, and organized with Mr. Ford chairman, Mr. Bill treasurer, and Mr. Clarke secretary. At this meeting, after a review and full discussion of the situation, it was unanimously decided that the Commission would strictly refrain from any propaganda tending to create throughout the State any sentiment in favor of improving the terminal facilities of New Haven harbor, but would devote itself exclusively to collecting material bearing upon the probable economic advantage to the commercial interests of the State at large which would proceed from improving the terminal facilities of the harbor. In other words, the Commission decided that its function lay in the direction of the collection of data, rather than in the direction of promotion of sentiment or exploitation. To this policy your Commission has rigidly adhered.

No provision having been made in the Act passed by the General Assembly for an appropriation to enable the Commission to carry on its work of investigation, a request was presented to the State Board of Control, which thereupon authorized the expenditure by the Commission of an amount not to exceed \$1,000, of which less than \$400 has been expended.

Directly after the organization of the Commission, it procured copies of the following documents bearing upon the subject in hand:

A: "Report of the New Haven Civic Improvement Commission," by Cass Gilbert, Architect, and Frederick Law Olmsted, Landscape Architect. This Report, published in 1910, was chiefly concerned with city planning, but also considered, to some extent, the harbor in its necessary relation to the plan of the city.

B: "Report on Railroad Station Approach and Harbor-Front Improvements," by Frederick L. Ford, a member of the Commission. This report, published in 1912, was prepared by Mr. Ford, when serving as City Engineer of New Haven, and constituted in effect an extension and amplification of the report made two years earlier by Messrs. Gilbert and Olmsted.

C: "The Gillette New Haven Harbor Terminal Facilities Report." This Report was made by Major Cassius M. Gillette, U. S. A. Retired, a distinguished harbor engineer, on the basis of studies of the problem made by him in 1912-13, when employed for that purpose by the New Haven Chamber of Commerce, which, at that time, undertook an active campaign, started by Mr. Seymour, a member of this Commission, to



provide the harbor with terminal facilities and to increase its value as a commercial asset of New Haven. Major Gillette was employed for this purpose on the advice of Former President Taft, who was then a citizen of New Haven, and who had been called upon as Secretary of War to consider problems akin to the New Haven problem.

D: "The Harding New Haven Harbor Terminal Facilities Report." This Report was made by Mr. H. McL. Harding, the well-known harbor terminal engineer and specialist, after an intensive study of the problem in 1920-21. Mr. Harding was employed for this purpose by the Hon. David E. Fitzgerald, Mayor of New Haven, and was assisted in preparing it by Mr. Edward S. Nettleton, then Acting City Engineer. The Harding Report, as presented to the Mayor, was accompanied by elaborate maps, plans, photographs and statistics.

Copies of these documents, A to D inclusive, accompany this report of your Commission,—A and B in printed and C and D in typewritten form.

Shortly after the organization of the Commission, Mr. Chandler of the State Chamber of Commerce, was interviewed, bespeaking co-operation with the Commission in securing statistics as to the tonnage and classes of freight that might be expected to use the proposed New Haven Harbor facilities. Such assistance was readily promised, but the work of the Commission, as it developed, did not turn in the direction of calling upon the State Chamber of Commerce for any tabulated statement of the statistical information of the character above specified.

The second meeting of the Commission, held at New Haven on November 2, 1921, consisted of two sessions. the first devoted to the general business of the Commission, and the second to a comprehensive survey by the entire Commission of both the east and west shores of the harbor, as well as the harbor frontage of the city proper.

The next—the third—meeting of the Commission was held at New London on November 15th, and was almost entirely devoted to an examination of the new State pier and facilities at this point, under the guidance of Mr. Clarke, Secretary of the Commission and Secretary of the State Rivers, Harbors and Bridges Commission.

At this meeting a committee composed of Commissioners Gagel and Ford were instructed to formulate a *questionnaire*, to be submitted to the members of the State Chamber of Commerce for the purpose of procuring statistical data as to the possible tonnage to be handled through the port of New Haven by industries located within the borders of the State, but outside of the City of New Haven.

Conceiving the City of New Haven to have the largest interest in the proposed provision of its harbor with terminal facilities, and with the aim of determining the extent of the interest which the New Haven Chamber of Commerce and the State Harbor Board might have in the project in hand, and of the character of any concrete constructive plan, if any, formulated by the said Chamber or Board, either or both, the Commission held a meeting (its fourth) on January 11, 1922, in the rooms of the New Haven Chamber of Commerce, and invited the entire membership of the New Haven Chamber of Commerce, including the Harbor Committee of the Chamber and the "Board of Harbor Commissioners for New Haven Harbor" (including the Harbor Master of New Haven) appointed by the Governor of the State, to appear before it and present their individual and collective views, and submit any maps, plans, statistical data, or other material, which they had collected as bearing on the subject. Between thirty and forty persons only out of the entire membership of the New Haven Chamber of Commerce were present at this meeting. The following synopses of the addresses of the evening are extracted verbatim from the minutes of the meeting, and are given in full to show that neither the State Board nor the Harbor Committee of the Chamber had, at that time at least, arrived at any definite conclusion or agreement as to the character and location of the proposed improvement, whereas, the Commission had hoped to find that the business interests of New Haven, expressing themselves through the historic Chamber of Commerce, would have organized and formulated some concrete plan, if no more than tentative. No evidence of anything more than individual interest and opinion appeared.

Mr. E. S. Nettleton, Chief Engineer of the City of New Haven, explained the various plans and charts as prepared by his office under the advice and direction of Consulting Engineer, Mr. H. McL. Harding. Mr. Nettleton stated that the channel should be dredged from its present depth of 20 to a final depth of 32 feet at mean low water. He stated that warehouses would ultimately be required, that a single warehouse would cost approximately \$400,000, but that a beginning could be made by building the quays and sheds only. Mr. Nettleton favored a compromise on the location of the initial development by using the east side of the harbor, part of the waterfront for commercial purposes and part for park purposes.

Mr. George H. Burgess, Chairman of the New Haven Chamber Harbor Committee, favored the initial development being located on the east side of the harbor.



Mr. Lucien Sanderson stated that the New Haven Harbor had been neglected because the New Haven people had been asleep and did not realize the great asset which the harbor gave to the City of New Haven and to the State of Connecticut. Mr. Sanderson was opposed to the development of the east side, stating that it should be reserved for park purposes.

Mr. L. J. Carmalt, Consulting Engineer, favored the development of the east side, stating that better rail connections could be had to the Cedar Hill yard; that the present Tomlinson Bridge should be rebuilt, that the present railway yards in front of the passenger station would be required to take care of the present and future passenger and freight through service. Mr. Carmalt advised the Commission that it should attempt to interest the State Grange in the development of the New Haven harbor.

Mr. M. E. Chatfield, member of the National Waterways Association, stated that if terminals are provided, ships and trade will follow; he discussed the relationship of the New Haven harbor to the inland waterways along the Atlantic Coast. Mr. Chatfield offered the suggestion that the terminals should be located on the west side of the harbor by extending City Boulevard into the harbor area, developing piers from that highway.

Mr. Edward P. Avery, Harbor Master, brought out the fact that improvements should be made to take care of ships up to 7,000 tons deadweight, requiring a depth of water of 30 feet. He stated that the first development would not pay for itself for a period of years but that it would more than pay eventually. He believed that a saving of \$2 per ton could be effected for the Connecticut shippers by developing the port of New Haven, due to heavy lighter and transfer charges at New York.

Judge Henry A. L. Hall, member of the Harbor Board, believed that the east shore should be reserved for parks; he favored the development of the initial development in the section near the Seamless Rubber Company's plant; Government co-operation would be made more certain if the initial development was located at this point, instead of on the northwest side of the harbor near Canal Dock, as the length of the main channel would be greatly shortened.

Mr. Sidney Stokes favored the development of the west side. He did not believe that the New Haven Railway Company had sufficient money to develop track connections that would be required on the east side of the harbor, as it would necessitate the reconstruction of the railway bridge and a heavy cost in extending track connections along the east side to the Cedar Hill yard.



Mr. William Hotchkiss favored the location of the initial development on the east side, stating that the east side area is an undeveloped section affording a cheap and an extensive area for sheds, warehouses and industrial railway yards and other pier development sites. Mr. Hotchkiss favored the extension of the east side piers further into the harbor than as called for on the blueprint submitted by Mr. Nettleton. He also stated that the development on the west side would require the use of very costly lands located in congested areas, resulting in extra heavy trucking in streets and extra heavy train service through the "cut".

Mr. E. E. Ball favored the development of the northwest section of the harbor near Canal Dock. He believed that the State and City would take over Canal and Long Docks for that purpose, expressing the idea that the New York, New Haven and Hartford Railroad Company should voluntarily deed these docks to the City or State.

Mr. Raut favored locating the initial development at the City Dock, stating the present City Dock provides rail transportation and room for extension. Mr. Raut expressed the idea that the City and owners of the existing waterfront should dredge their own slip areas and channels to the proposed government channel.

Mr. Frank H. Mason, of the New Haven Harbor Committee, suggested the use of an area south of that on which the American Velvet Company is located for the initial development. He stated that this area contained practically eight acres of land and was now being held in trust for the New Haven Chamber of Commerce by three of its members. He favored the establishment of bulkhead and pierhead lines, the dredging of 700 foot slips and the building of piers to be able to take care of two 7500 ton steamships. Mr. Mason offered to turn over necessary maps and data to the State Commission.

Mr. Edward Gagel, speaking as Chief Engineer for the New York, New Haven and Hartford Railway Company, stated that Tomlinson Bridge would have to be rebuilt in order to handle heavier freight loads, if not done by the City the Railroad Company would have to build a bridge for its own use.

Chairman Ford, in bringing the meeting to a conclusion, stated that it would be necessary for the State Commission and the New Haven Chamber of Commerce to bestir themselves, as a great deal of missionary work would have to be done in the "up-state" section. That this section would have to be consulted and won over to the proposition for developing New Haven harbor; that they must be convinced that the proposition was not one to benefit New Haven only.

The meeting discovered gratifying enthusiasm on the part

of the speakers, but, as appears from the above extracts, there was no concensus of opinion as to what should be done first, and no evidence on the part of New Haven business interests of any "getting together" to back the enterprise, and no evidence that the project had been sufficiently, or at all studied in conjunction with the allied questions of transportation facilities, city planning, zoning, park development, and the location and character of the new Tomlinson Bridge.

At an "executive session" of this same meeting, Messrs. Ford and Gagel submitted a draft of a *questionnaire*, which was approved, and the Secretary was asked to have it printed and sent to a selected list of addresses, covering members of the Manufacturers' Association of Connecticut, members of the State Grange, and many business organizations, the purpose being to ascertain, if possible, the attitude of the industrial interests of the State at large toward the project of providing New Haven harbor with improved terminal facilities. A copy of the *questionnaire* follows:

#### QUESTIONNAIRE LETTER

During the last Legislature a bill was passed providing for the appointment by the Governor of a Commission to be known as the development commission of New Haven harbor. Complying with the provision of this Act, the Governor has made the following appointments:

Frederick L. Ford, of New Haven, Conn.,  
Waldo E. Clarke, of New London, Conn.,  
Charles G. Bill, of Hartford, Conn.,  
Edward Gagel, of West Haven, Conn., and  
George Dudley Seymour, of New Haven, Conn.

The bill provides that said commission shall inquire into and, on or before October 1, 1922, present a report addressed to the Governor and the General Assembly, upon the facilities of New Haven harbor, making such recommendations as may be deemed advisable for the future development thereof with a view to the prompt and efficient handling of passengers and all classes of freight, the construction of permanent works and the probable expense thereof.

The Commission has applied to the State Chamber of Commerce to circularize its members through the local chambers, to find out to what extent the inland manufacturers and merchants of Connecticut would be interested in the development of New Haven harbor and to what extent they would take advantage of such additional transportation facilities. To facilitate the Commission



in reaching conclusions upon which to base its report to the 1923 Legislature, your co-operation and advice upon the following questions is most important.

1. Would the further development of the New Haven harbor and the installation of modern terminal facilities be of material advantage to you or to your Company?

2. What classes of cargo would you wish to have carried and their probable destination?

3. What return cargo could you receive from destination of cargo forwarded by you?

4. What would be character and tonnage of cargo you would ship and character and tonnage by return vessel?

5. Would suitable warehousing facilities at New Haven harbor, for temporary storage of outbound or inbound cargoes, be of a material assistance to you?

The Commission will appreciate any suggestions you have to offer along the line above indicated, to the end that the report to the next Legislature on the further development of New Haven harbor will be fair, impartial and exhaustive.

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The fifth meeting of the Commission, held at New Haven, February 23d, was devoted to a review of the situation, with particular reference to the attitude of citizens of New Haven, as developed by the Chamber of Commerce meeting on January 11th. It was the sense of this meeting of February 23d, that the Commission should forthwith make a special effort to determine the attitude of the City officials and to endeavor to get their co-operation in the collection of data bearing upon the issues involved, as well as to disabuse them of the idea which seemed to prevail, that it was a part of the function of the Commission to create sentiment favorable to securing an appropriation of State funds for the project, rather than to collect data which should indicate whether or not the industries of the State at large would be benefitted by the improvements contemplated. In pursuance of this policy, the Secretary of the Commission was directed to wait upon Mayor FitzGerald and lay before him the situation as conceived by the Commission, with particular emphasis on the following points; viz:

A: That the Commission was not intended to create sentiment in favor of the project, but only to collect data bearing upon its economic advantages to the State at large.

B: That detailed and definite information was desired by the Commission bearing upon the need of additional deep-sea steamship terminals at New Haven.

C: The desirability of the appointment, by the Mayor, of a local committee, chosen from the Board of Aldermen, the Chamber of Commerce, the Rotary, Kiwanis and Lions Clubs, to study conditions, collect data, and concrete facts and figures, to show the State-wide need of terminal facilities for New Haven harbor.

D: The desirability of providing for holding meetings in Waterbury and other cities and towns, so that the advantages could be pointed out to the business interests of the State at large that would result from the opening of New Haven harbor for ocean service.

E: That sentiment throughout the State favorable to the project was essential to its success, and as the creation of such sentiment was without the province of the Commission, it could be created only by some other body and logically fell to New Haven enterprise.

The Secretary of the Commission waited upon the Mayor and presented the situation to him, as directed. The Secretary then reported, under date of March 7th, to the Commissioners, that he had waited upon the Mayor, who had gladly received the several suggestions and informed him that he would organize such a Committee and "get things working" as soon as possible.

In this same letter of March 7th, addressed to the members of the Commission by its Secretary, it was stated that 1500 of the questionnaires had already been sent out, and that a large number more would soon be put in the mails.

The sixth meeting of the Commission was held at New Haven on April 24th. At this meeting the Secretary reported that no less than 2500 copies of the Commission's questionnaire had been issued to a carefully selected list of members of the Connecticut Manufacturers' Association, the State Chamber of Commerce, the State Grange, etc. At the date of this meeting, only 191 replies had been received. One hundred and twenty of these replies disclaimed interest in the project of developing New Haven harbor; 52 expressed interest in the project; 19 expressed interest solely in increased facilities for handling coal, and 57 questionnaires were returned unclaimed. Out of 200 blanks forwarded to members of the State Grange, but three answers were received, of which two were negative and the other affirmative.

The failure of the Commission's effort to collect data bearing on the question in hand from business interests throughout the State repeated similar failures following the attempt of Major Gillette in 1913 and of Mr. Harding in 1921 to collect such information by means of widely distributed questionnaires.



The Commission here expresses the opinion that the only practical way of collecting the data sought to be secured by its questionnaire, is the employment of a representative to personally visit the leading manufacturers and merchants throughout the State and secure from them, by direct personal interview, figures indicating what use they might advantageously make of the transportation facilities afforded by New Haven harbor, if provided with such terminal facilities as are comprehended, for instance, in the reports of Major Gillette or Mr. Harding.

At this sixth meeting of the Commission, it was determined to make another effort to ascertain what plans, if any, had been formulated by the City government or by the business interests of the City for supporting the project in hand. It was accordingly voted to hold another joint meeting, similar to the meeting of January 11th, and that the Mayor of New Haven, members of the Harbor Committee of the Chamber, and others should be invited to attend.

The seventh meeting was held at New Haven on May 8th. This well-attended meeting lasted for three hours, and those present discussed the question in hand from many angles. The Mayor did not attend, but was represented by Alderman John Murphy, who stated that he was not authorized to offer any definite program on the part of the Mayor, nor was any definite program offered by anyone present. One of the out-of-town members of the Commission expressed himself very forcibly on the point that, in his opinion, it would be useless to look for an appropriation from the General Assembly to forward the project, unless it could be made to appear that the City of New Haven,—the largest beneficiary of the project,—was behind it with a definite engineering and financial program and was also supported by business interests organized for the purpose.

The eighth meeting took place in Hartford on June 7th, and was attended by His Excellency, Governor Lake. At this meeting, the work of the Commission was reviewed, and the character of its report to the General Assembly was forecast. Inasmuch as it appeared to the Commission that the New Haven public at least were of the opinion that the Federal Government would forward the undertaking by conducting dredging operations as rapidly as warehouses were built and apparatus installed, it was thought that the Commission should secure authentic information on these points from headquarters. At this meeting, therefore, the Secretary of the Commission was directed to proceed to Washington for the purpose of interviewing Brig. Gen. Harry Taylor, Assistant Chief Engineer. Accordingly, Mr. Clarke made an appointment

with Gen. Taylor, whom he interviewed in Washington on June 19th. His report to the Chairman of the Commission was as follows:

Your Secretary made a hurried visit to Washington on June 19, 1922, and interviewed Brigadier General Harry Taylor, Assistant Chief of Engineers, of the War Department at Washington, D. C.

The writer explained the organization and purpose of the New Haven Harbor Development Commission as provided by the Act of the State Legislature, with special reference to the second paragraph of the "Act making inquiry as to the attitude of the Federal Government toward the further development of New Haven Harbor."

General Taylor explained that the policy in regard to the improvement of harbors and other navigable waters by the Federal Government is in the hands of Congress, and that the Engineering Department is not in a position to give assurances as to the Federal appropriations for improved facilities at any harbor. The procedure under which improvements are initiated lies, first in the authorization by Congress in a river and harbor bill of an examination and survey of the locality. Such an examination and survey is made by the Engineer Department, and the report, after a review by the Board of Engineers for Rivers and Harbors, as required by law, is submitted to Congress. This report furnishes information by which Congress determines the advisability of an appropriation from the Federal Treasurer.

Without a full investigation into the matter, authorized by Congress, the Engineer Department obviously could not express an opinion upon the worthiness of the proposed work, or upon the extent to which the cost should be borne by local interests and by the Federal Government respectively.

Brigadier General Taylor further suggested that it would be necessary for our representatives in Congress to secure the authorization of an examination and survey of the New Haven Harbor. As such an examination and survey cannot be accomplished and reported upon before the date fixed by the State law for the submission of the New Haven Harbor Development Commission's report, he suggested that our Commission consider a recommendation that the matter be held for further conference with this department after the authority of Congress therefor has been secured.

Your Secretary inquired whether there were not unwritten rules governing the policy of the Federal Gov-



ernment in the various harbor development projects. In other words, I attempted to put a hypothetical question to General Taylor in hopes that an answer would be made which would give our Commission some assurance of the extent of Government co-operation in the development of New Haven Harbor. I raised the question as to what extent would the Government co-operate in giving New Haven Harbor a thirty-three-foot channel, provided the terminal facilities and channelways to the main government channel were constructed jointly by the City and State. I was informed that there were no unwritten rules, that each project must be considered on its own merits in the light of the needs of commerce and navigation. The fact that local interests are prepared to expend considerable sums on terminal developments obviously establishes a presumption that the harbor is worthy of improvement by the Federal Government, but such a presumption cannot be considered conclusive. A number of instances have arisen in which local interests have offered to meet a large proportion of the cost of the improvement and in which on thorough investigation it has been found that the improvements proposed was not justified by the benefits of commerce, irrespectively of the agency which met its cost.

The river and harbor act of June 5, 1920, contains the following provisions: Every report submitted to Congress in pursuance of this section or of any provision of law for a survey hereafter enacted, in addition to other information which the Congress has heretofore directed shall be given, shall contain a statement of special or local benefit which will accrue to localities affected by such improvement and a statement of general or national benefits, with recommendations as to what local co-operation should be required, if any, on account of such special or local benefit.

It would therefore be necessary for the City and the State jointly to be prepared to inform Congress, as provided above, as to the amount of local co-operation, whether in the form of terminal facilities or a contribution toward the cost of the general improvements.

In a further discussion it was brought out that the Board of Engineers for Rivers and Harbors recently approved Federal co-operation in the development of the port of Corpus Christi, Texas. This section of the country is a rapidly growing section and its railway facilities are being greatly increased; it is two hundred miles from the nearest port.

In attempting to solicit the aid of the Federal Government, the Corpus Christi Committee made an industrial survey; hundreds of pages of statistics and data, proving conclusively that rail and water trade would result; showing that a saving of a dollar a bale on cotton would result upon the completion of such a project. From such information and upon proper investigation the Board of Engineers for Rivers and Harbors approved and recommended that Congress appropriate sufficient money to carry out the plan.

In bringing the case back to New Haven, it was definitely pointed out that inasmuch as there were so many harbors in New England and in such close proximity to New York and Boston, it might be a very difficult problem, in making an industrial survey, to show an extensive area to draw tonnage from, which would justify the engineers in recommending federal co-operation.

It was pointed out to your Secretary that the Engineer Department made a report, concerning New Haven Harbor, to Congress in 1920, and that this report was unfavorable. This report has not been printed. Upon requesting the unprinted report, I was advised that it would be necessary to have the matter brought up in Congress and have some printed for public use.

From the above information it is obvious that, to have the United States Federal Government co-operate with the City of New Haven and the State of Connecticut in the further development of New Haven Harbor, it would require an extensive industrial survey and the submission of definite facts and figures, so as to prove to the Engineers the necessity of such a project.

In discussing the depth of water required at New Haven, it was pointed out to the writer that it was very doubtful whether Congress would consider any project asking for more than thirty feet of water.

The ninth meeting of the Commission was held on August 28th, and was also attended by His Excellency, the Governor. At this meeting a tentative report was read, followed by a discussion in which the Governor took part. This final report was prepared as the result of that discussion.

The conclusion of the Commission may be summed up as follows:

*First:* That in the time allowed and with the limited funds available and owing to the disturbed state of business following the War, your Commission has been unable to secure data warranting any definite action at the present time.



*Second:* That any appeal to the General Assembly for assistance in the matter of providing terminal facilities for New Haven harbor must be preceded by the commitment of New Haven to a definite program, and also by the appearance in New Haven of an organized effort to stand behind the project, not only with funds, but with active moral support.

*Third:* That the co-operation of the Federal Government can only be secured after the City of New Haven and State of Connecticut have taken definite steps in the premises, and have determined upon a works-program and have actually begun the work of initial installation.

*Fourth:* That New Haven harbor, if provided with terminal facilities, might be utilized to great advantage by the citizens of the State at large as an additional means of transportation of coal, lumber, fertilizers, lime, stone, cement, and other bulky commodities.

Your Commission recommends the printing of this report and the reports of Major Gillette and Mr. Harding as appendices to it, for the use and guidance of future investigators of the subject.

Respectfully submitted,

FREDERICK L. FORD, *Chairman.*

WALDO E. CLARK, *Secretary.*

CHARLES G. BILL.

EDW. GAGEL.

GEORGE DUDLEY SEYMOUR.

**APPENDIX A**NEW HAVEN  
REPORT

of the

## CIVIC IMPROVEMENT COMMISSION

Cass Gilbert, Architect

Frederick Law Olmsted, Landscape Architect

1910

Copy on file at the State Library, Hartford, Connecticut.

**APPENDIX B**

## REPORT

on

## RAILROAD STATION APPROACH

and

## HARBOR FRONT IMPROVEMENTS

Made to

Hon. Frank J. Rice, Mayor of the City of  
New HavenMr. Amos F. Barnes, Chairman Aldermanic  
Approach Committee

By

FREDERICK L. FORD

New Haven, Connecticut, September 24, 1912

Copy on file at the State Library, Hartford, Connecticut.

Appendices C and D printed as a part of this report.

**APPENDIX C**

New Haven, Conn., December 31, 1913.

Mr. George Dudley Seymour,  
Secretary, City Plan Commission,  
New Haven, Conn.

Dear Sir:

In compliance with your request I have made a general examination of New Haven Harbor and its surroundings, with a view to a correlation of future port development and connected subjects with the plans for the general betterment of the city, and beg to submit the following general report. New Haven Bay constitutes the most important harbor on the coast of Connecticut, this importance depending upon its size, its location with reference to rail connections, its accessibility and safety.

The most important of these is the fact that railroad lines radiate like the spokes of a wheel, to the West, Northwest, North, Northeast and East, and traverse a highly important manufacturing region. No other Connecticut port is situated so advantageously in this behalf.

The territory normally tributary to New Haven is the western two-thirds of the state, a goodly part of western Massachusetts, a portion of Vermont and New Hampshire, and even a little of the State of New York. In this region are located many important manufacturing towns, whose future welfare, like that of all manufacturing New England, will depend upon cheap transportation.

New England's principal asset as a manufacturing section has depended upon her abundance of skilled mechanics. It has been handicapped by the fact that its food, fuel, lumber and raw materials generally have to be imported. It is not very expensive to move skilled labor once, but it is expensive to continuously move heavy freight. This fact is illustrated by the tremendous development of the Middle West as a manufacturing region. Practically none of the recent enormous automobile expansion has accrued to New England. Similarly with the cotton industry. Mills in the South run by cheap coal, cheap water power, developed almost in the cotton fields, with cheap labor and less rigorous climate, calling for less fuel, less clothing, less food and cheaper houses, seriously handicap New England, which requires not only all of these elements in a more expensive way, but the freight upon the cotton itself.

Another example,—Pennsylvania tans vast quantities of



leather, then ships the leather with the coal necessary for power to New England, and ships back a large percentage of the completed shoes. It is the same with anything else. To progress normally in the future New England must cheapen freights. The cost of transshipping general freight from ships to trains, or to drays, will as a general thing carry that freight about a thousand miles at sea, and rail transportation is from ten to twenty times as expensive as water transportation. It therefore behooves manufacturing New England to have all possible freight brought by water, then put on the cars for final shipment at the minimum expense. Generally transportation is controlled by lines along which it must go and cities located at transfer points prosper from the very expensiveness of the transfer. It would obviously be the part of wisdom for manufacturing New England to so manage as to reduce these costs of transfer to a minimum and make its direct profits from its manufacturers.

The City of New Haven, with its fine harbor, located as the hub of the wheel in which the radiating railroads correspond to the spokes, has therefore a very unique opportunity to benefit not only itself but the manufacturing country naturally tributary to it. The City was originally planned as a seaport and its early growth was based almost exclusively upon commerce. It is astonishing how much that asset has been neglected in recent years. The wave of railroad construction which has swept this country in recent decades caused everywhere a neglect of canals, lakes, navigable channels and ports. New England has been no exception. Instead of New Haven being the distributing center that it normally should be, New York has been that center and an added freight charge, due to the haul of 70 miles and back, has handicapped the development of the country, really to the detriment of the railroad, because the greater development of the country, due to cheaper freight rates on heavy materials, would have much more than made up to the railroad in higher class freights and passengers what it would lose in the hauling lumber, coal and similar products.

New Haven's present size is dependent principally upon three things, Yale College, which probably accounts for 15,000 of the population; the railroad headquarters and shops, for probably as much more, and the remaining one hundred thousand upon its manufacturing. The proper development of port facilities should very materially increase that population and might even double it, so that the matter is worthy of the most serious consideration of the City, as well as that portion of the State normally tributary to it.

The important question is "How can the City best aid the bringing of commerce to this port and distributing it so that



the City and the country tributary to it will get their supplies and ship their product at the minimum cost for transportation?" Beyond doubt the point where the greatest benefit can be accomplished is in getting the freight from the ship to the cars and conversely. European ports have spent astonishing sums in this behalf, a great deal of which has been on plans of unnecessary expense and comparatively poor efficiency, but their experience has laid the foundation for the development of compact, scientifically managed, systematic terminals of very great efficiency. New Haven is very well adapted indeed to such a terminal and its expense need not be at all extravagant in proportion to its direct economies.

The time lost by ships riding at anchor is a very serious matter, generally overlooked, but someone is paying a heavy interest on the cost of the ship and the wages of its crew whenever it lies idle. Any addition, therefore, to the direct saving of an efficient terminal which handles the goods much more cheaply than the ordinary clumsy methods in the time of the ship saved makes possible a further net reduction in the total freight charges and makes the port an attractive one for ship owners.

It therefore seems to me that the wisest thing New Haven could do would be to plan now and even begin the gradual construction of such a terminal with a view not to terminal profits, which have proven very great in the Bush Terminal of New York for example, but for the bringing of shipping to the port, which in itself carries with it repair shops, shipyards, ship chandlers and a growth of business generally.

The future lumber for the territory tributary to New Haven will doubtless come from the South and from the Oregon country, through the Panama Canal. This Canal will likely develop a great many lines of traffic which will change existing routes very materially. Nearly every port of any importance on the eastern seaboard is making preparations to take advantage of the Canal. New Haven is the focus of a section large enough to be of importance in this connection. The wheat, lumber, canned goods, wines, dried fruits and many other products of the Pacific region, can very advantageously be received here for the tributary section.

The opening of the New York Barge Canal is going to give exceedingly cheap freights for the wheat and other grains, hardwoods and analogous products of the Great Lakes region, including Canada, and the barges handling such things can come to New Haven from New York without any trouble whatever. Cheap fuel can be brought here in barges from Perth Amboy and still cheaper from the Norfolk district. There is also plenty of water power in this part of New

England and it would look as though woodworking establishments and flour mills should properly be located here, as it is less expensive to ship rough lumber and wheat than it is the finished products. Agriculture in Connecticut will surely revive with the aid of fertilizers made of materials from Chili, Florida, and Virginia, all of which can be brought to New Haven very cheaply and properly manufactured here for distribution.

European ports have generally had to develop not only their terminal and their port facilities, but the harbor depths as well. This latter the government does for New Haven and she need concern herself therefore only with the terminal.

There are many elements that enter into the determination of the best location for such a terminal, but apparently beyond doubt there is no question but that such a terminal would best be located in the area between Long Wharf and Oyster Point. It is almost ideally located for convenient connection with the railroad, an all-important matter. It is also exceeding well located with reference to the Government channel and anchorage. The necessary space for it can be built up at moderate expense by using the material dredged in the necessary widening of the anchorage and channel to accommodate the increased shipping which such a terminal would undoubtedly bring.

The details of such a terminal would, of course, require considerable study and investigation of the existing and prospective commerce, but it should in general consist of a series of wharves parallel to each other and about parallel to Long Wharf, with appliances on those wharves for lifting by machinery vertically out of the hatches of the vessels the freight which they bring and carrying it by an overhead conveyor system either to drays for the City or to cars for the tributary country. The exact machinery and distribution of tracks and warehouses would depend entirely upon the freight proposed to be handled, and in general a railroad track on each side of the terminal connecting with the east and west main lines, and with a series of cross tracks, parallel to each other, between them for the quick storage and removal of cars, and the partial making up of trains are obvious elements of the structure. Fire-proof warehouses for the safe temporary shelter of goods coming in should be planned for and supplied as needed. Indeed, this feature might possibly be very advantageously extended to include fireproof storage warehouses for the manufactured products of the district which would greatly facilitate their prompt shipment, since they would be systematically stored and scheduled right in the vicinity of an organized force and plenty of cars instead of requiring special emergency work



to get the necessary cars to the factory, often located inconveniently for this work. The ability to make prompt shipments from storage is a valuable asset to any manufacturing concern.

Especially for handling lumber would such a properly equipped terminal be advantageous? Heavy timbers are put into schooners in the South by sliding them "down hill" into a bow port by cheap negro labor. Getting such timber out is a very difficult and expensive process, if done by hand. A properly equipped terminal for this business would mean a great saving in the cost of all timber construction throughout the district. A wharf of the "saw tooth" shape in plan could be readily adapted to the very economical handling of this important freight.

Government appropriations for harbors are generally very unwisely scattered and are often properly referred to as so much "pork" to be expended in each neighborhood. The plan adopted for Texas should be more or less adopted for other states. There a competent Board picked out the right harbor for the principal port for Texas and the appropriations from the Government were concentrated on that port and produced very satisfactory results. The section tributary to New Haven, or indeed the whole State, should organize in some manner to see that such appropriations are wisely distributed, or perhaps more correctly, wisely concentrated to give the greatest real benefit to the commonwealth as a whole.

Obviously the general plan for such distribution would be for the general run of small harbors along the coast to be improved with the view to barge and schooner transportation to the various manufacturing plants of that port, few of such ports having any tributary country to speak of behind them, but that New Haven, when provision has been made for a proper terminal, be provided with a channel deep enough to receive boats from beyond Hatteras, from the Panama Canal, occasional tramp steamers from anywhere, and even possibly a regular line of sea-going steamers to foreign ports.

New London stands out somewhat from the other harbors and the State has made some special provision for it, but it has no radiating system of railroads like New Haven has and outside of its local manufacturies, has no unusual value except possibly an export and import point for Canadian and Vermont regions, it having as a port for them some advantages over Portland or Boston, or any other point east of Cape Cod.

It has been proposed recently to fix the future development of the port of New Haven by a set of harbor lines, to be established at once. Certainly before this is done, some definite plans for the suggested terminal should be given full and care-

ful consideration. In general harbor lines are designed to limit encroachment of private individuals upon water area necessary for maneuvering vessels, or for furnishing the tidal volume to help keep the channel scoured out. In both of these particulars New Haven is fortunate. The area for anchorage and maneuvering is apparently ample for all future needs, with a considerable allowance for the filling in of tidal flats, and the tidal volume is so ample and the sand movement at the entrance so slight, that the increase of dredging that might be put upon the government by a liberal use of the necessary area for a proper terminal would be a bagatelle. The only sand that drives into the harbor is that coming from the ocean front along Savin Rock. The spur dike and training dike off Oyster point form a catch basin capable of holding all the sand likely to be driven in there in all future time.

The State and municipal plans for the improvement of the water front at Savin Rock impinge upon the harbor problem in the above connection and upon the planning of a future State Park in that this water front can be made a most beautiful and important summer breathing place, not for New Haven only, but for the entire tributary district. Its approaches by land and by sea should be considered in connection with the general harbor problem so that one work will not interfere with another.

For example, the sewers which empty into the harbor are an objectionable feature in that they form shoals often requiring removal at inconvenient periods, they pollute the water, making the harbor very unattractive to shipping, and they will ultimately injure the healthful advantages of the proposed State Park in Savin Rock, polluting the water for bathing purposes and rendering the beach objectionable. Sewage is also a menace to the health of the people by polluting the oyster beds, which pollution will extend continually further and further from the city, making the sewage disposal an important matter in connection with the proposed terminal, as well as other subjects mentioned, because the location of possible future sewage disposal plants should not be interfered with by the location of a terminal or other structures.

The second best location for such a terminal would be on the east shore of the harbor above Ft. Hale Point. This would be an excellent site for future factories, and it would probably prove profitable to the city to purchase it now, with a view of its location later on as free sites to induce manufacturers to locate here, with the possibility of an additional terminal being located there in the somewhat distant future.

It is of course obvious that the above plan is feasible only with the co-operation of the railroads; in fact the co-operation



of the Government, the State, the City and the Railroad Company, are essential and it would undoubtedly be made of mutual benefit to all four of them. The Government, of course, benefits by what benefits any section of the country and if its work of having begun a harbor is met by effective endeavors on the part of the State and City to utilize the improvement, the Government gets some returns for the investment beyond mere gratitude to the "pork barrel".

The City and the State will profit by their growth as manufacturing neighborhoods, and the railroad will of course doubly profit from the prosperity of the country which it serves. There is a distinct rivalry between the territory of this railroad and the territory of the railroads of the Middle West and I can conceive of no policy more advantageous to the railroad than to help develop its territory rather than apply the short-sighted policy of the late C. P. Huntington to thrive only by putting on "all the traffic will bear".

There are apparently no engineering features to interfere at all with the above general plan. No sign of any rock ledge has ever been found to prevent any reasonable deepening or widening of the channel, dredging is exceedingly cheap and can be made even cheaper when arrangements are provided to pump the material ashore, the filled-in ground will make an excellent foundation for any reasonable structure and if the City and State will awaken to the value of the port as an asset, there should be no difficulty in its realization. True, the function of a City in bolstering up a terminal is a more or less novel one. For the City or the district to aid in the construction of such a terminal requires no wild flight of imagination; for a city to undertake to operate such a terminal is a novelty, for which success could not definitely be promised, but for a combination to be made of the State or the tributary district, the City, the Railroad Company and perhaps an operating company, all under the control of a joint Board or Commission, as has frequently met success in Europe, should be within the business genius of the people concerned. That, however, is a matter more for the lawyer, the business man and the statesman than it is for the engineer.

Conclusion: To investigate and develop the above necessarily somewhat general ideas I would make the following recommendations:

1. That the City acquire control, or as near control as possible, of all the land between high and low water in the harbor now under control of the State.

2. That it be prepared before the next Government contract for dredging is let, to build the temporary structures necessary to retain dredged materials pumped ashore at any

point in the harbor where such retention may appear to be of future advantage.

3. That the necessary legal investigations be made and plans arranged for future legislation promoting the joint action of the State, the City and the Railroad in connection with the port.

4. That effective action be planned for the distribution of the appropriations in the next River and Harbor Bill to concentrate the bulk of such improvements on such harbors as naturally serve the larger sections of country back of them.

5. That a detailed study of the suggested terminal and its adaptation to future commerce be made by the City in connection with the Railroad Company. Should the Railroad Company not enter into the matter, the only remedy for the City would be to secure legislation wherein the rate per ton mile on the same classification of freight would be the same from New Haven that it is from New York. Then a terminal might be provided with success but the full and willing co-operation of the Railroad would make it vastly more effective.

6. That the subject of a possible future system of fire-proof warehouses at the terminal to be partly used as a storage place for local manufacturers, or for manufacturers in the district be carefully studied. The use of trolley lines, especially at night for such freight transportation, might make the plan a very attractive one, since the location of the terminal, both on the water front and at the point of greatest facility for quick rail transportation, might prove an exceedingly valuable one.

Very truly yours,

CASSIUS E. GILLETTE.

New Orleans, La., April 18, 1914.

Col. I. M. Ullman,  
President, Chamber of Commerce,  
New Haven, Conn.

Dear Sir:—

I have the honor to submit the following report and accompanying plans showing the proposed Boat and Railroad Terminal at New Haven designed to facilitate and cheapen transportation to and from points in the State of Connecticut and western Massachusetts.

The design of the terminal must depend in general upon the kinds and quantities of freight to be handled. The following is an estimate of the principal freights now sent or received annually in the district that will be naturally tributary to New Haven when proper use is made of its harbor and the railroads that radiate fanwise from that point.

Coal .....	2,000,000	tons
Lumber .....	250,000	"
Sand .....	35,000	"
Cement and plaster.....	15,000	"
Brick .....	75,000	"
Stone .....	70,000	"
C. I. Pipe .....	25,000	"
Iron and Steel.....	200,000	"
Fertilizers .....	50,000	"
Cotton .....	50,000	"
Paper Pulp .....	100,000	"
Copper .....	200,000	"
Spelter .....	50,000	"
Miscellaneous .....	500,000	"

I find that except a part of that used locally no radical improvement can be made in the economics of handling coal, it is a good plan for obvious reasons to handle coal and package freight at the same wharf. So coal is omitted from the discussion. It may be noted, however, that in the future at some time it might be well for the State or municipality to provide storage for a liberal quantity of coal to protect the district from heavy loss during prolonged strikes in the mines. A part of the wharfage area of Waterside Park could be advantageously used for this.

Lumber is not economically handled. Except, however, as to hardwoods or manufactured lumber in small quantities it is not advisable to unload and store lumber in connection with



handling and storing valuable package freight, on account of fire risks and the excessive room required. Most of the lumber of the district now comes through New Haven, and the quantity will probably not increase very materially, though the opening of the Panama Canal may add somewhat to it. Better facilities for handling would probably increase the quantity by drawing from other ports and the increased use that come from reduced costs of any material.

The outer portions of Waterside Park would be the best available space for such unloading facilities. A movable crane for lifting lumber from the decks and hatches of vessels and placing it on cars is about all that can be done for small stuff. For timber a "saw-tooth" edge to the wharf so that ships may lie in an advantageous position for the pulling of timbers out through bow ports with a movable hoisting engine and snatch blocks would aid very materially in getting heavy stuff out of ships. An inclined platform up which to draw the sticks to a level above car floors would also aid very materially in putting the timber on the cars. Such arrangement is so obvious that no drawings are presented.

The design of the terminal proper is based on the following considerations:

1. Freight from ship to car, dray, or storage, should be moved direct with as little rehauling as possible, machinery to be used wherever promptness or economy justify it.

2. The all important matter is to get the ship unloaded or loaded in as short a time as possible.

3. Fire-proof storage especially for manufactured goods is an important matter. The economical height and location of such warehouses vary with local conditions, as to cost of land and labor, etc.

4. Cold storage and express facilities are valuable adjuncts.

To fit these varying conditions a wharf long enough to accommodate about two steamers or several schooners and barges located East of Long Wharf is planned, with a fire-proof warehouse parallel to it, the axis of each being at right angles to Brewery Street. The inshore end is shown 400 feet from Brewery Street, and the wharf is laid out 1200 feet long; the pier shed and warehouse are 150 feet less. This layout is very favorable to mechanical transportation.

By putting the short cross transportation in the form of overhead trolleys we get quick results in taking the freight away from the ships and by putting the longitudinal transportation on the floor the two systems do not interfere with each other, and the latter may be used in a most advantageous

way in helping to get the goods away from the ship quickly.

I have shown a two story structure for both wharf and storage; the lower story high enough for overhead trolleys to go over the railroad cars empty. If loaded the cars must be moved out of the way. The principal cross transportation is overhead in the second story which is made low for easier handling. In the upper story longitudinal transportation is provided for by industrial track and cars, the rails being flush with the floor to avoid interference with hand trucking. In fact the whole structure is designed with a view to permit all the appliances including hand trucking to be used at once. In the lower story a track just inside the building next to the side of the ship gives convenience both in loading and unloading. This track is depressed so that ordinary flat cars with their tops of uniform width closely fitting in the floor opening, can by steel flaps covering the spaces between cars be made into a movable section of the floor, exactly where the congestion comes when the goods are discharged rapidly. By moving this line of cars along slowly by suitable simple appliances, or even by pinch bar, the most rapid unloading can be provided for, the excess being cross transported while unloading or at convenience later. It makes no interference with hand trucking and dray, car, or storage, can be availed of at the same time.

To facilitate unloading in case the ship is not suitably equipped I show a type of crane which moves the freight only, and that in the most direct line to the desired point in the wharf. Generally such machines involve the movement of heavy masses of machinery with every load, a great waste of energy to overcome the friction.

This appliance can be used at any point along the wharf shed and deposit the freight directly on cars on either floor. It works just as well for loading as for unloading.

The overhead trolley in the upper story can take freight from the car where deposited by the crane or by the "burton" sling arrangement generally used on ships, and deposit it directly in an open car on the floor below, or in a shute carrying it into or alongside a box car or into a dray, or upon the floor of either story, or into storage direct. As many of these various load capacities as desired can be installed on the upper floor, or on the lower floor, except that both floors could not advantageously be led into the storage warehouses on account of the undesirability of so many doors.

The back wall of the freight shed is shown of brick with a ten foot space between it and the warehouse wall, for fire safety.



For the same reason the several rooms in the warehouse are separated by solid brick fire walls. I have shown 17 such rooms about 40 by 80 feet in plan.

Materials can be taken out or put into the warerooms, team, via the 25 foot driveway back of the building and a door into each room, the driveway being three feet below the floor level.

The cost of the sheet piling necessary to hold the mud to be dredged by the government to make a fill with its outer edge 400 feet south of south line of Brewery Street clear across the harbor is estimated at \$25,000. It can be done in shorter sections at a slightly increased proportional expense.

The terminal as shown is estimated to cost \$820,000. It need not all be built at once. Reducing its length by one 40 foot warehouse reduces the cost by \$31,000. Similarly for several at the same rate. Changing both pier shed and warehouse to one story and making that high enough to pass ordinary freight over box cars on the track, the total cost would be \$745,000, which would be reduced by \$27,000 for each 40 foot length it were shortened. The slip for the New York boat shown would cost about \$115,000, including shed and two Otis inclined elevators for assisting men with hand trucks. The express equipment shown would cost about \$11,000 extra. I have made no design for a cold storage warehouse, as I have not data enough to estimate its capacity. Each office for a wholesale grocer who might wish to locate at the Terminal would cost about \$2,500. There would be a great many advantages for a grocer located there.

The question as to who should pay for such a terminal, if built, is an important one. Provided the railroad would make suitable and equitable rates so that commerce would follow the line of lowest actual cost, the City of New Haven would doubtless find it a paying venture in the long run to build the Terminal itself by a bond issue, paying the interest direct on the idea that the increased taxable values would cover it and making no charges beyond enough to pay actual operating costs and repairs.

On the other hand those charges could include enough to pay the bond interest also and still, I believe, prove exceedingly attractive to commerce.

But the benefit extends not only to the city of New Haven but much more so to about two-thirds of the State of Connecticut, and the State could very properly appropriate funds for it just as it has done at New London.

At the latter point, there being no radiating lines of railroad, the State is really much less interested than it would be at New Haven. Indeed the engineers have been planning



there two years and are still so uncertain as to what kind of traffic may be expected that the superstructure is still undetermined. Apparently that terminal will benefit New London and possibly a part of Vermont and Canada, but not be of so striking a benefit to the State general as the proposed Terminal at New Haven.

The questions as to who should operate and its relations to the railroad are not simple ones.

In the past the railroads have unwisely, I think, destroyed water competition wherever they could. It is being claimed today that the Panama Canal will not reduce freight rates to the Pacific Coast because the railroads will only bring freight at either terminus of the routes to favored lines.

The Railroads in New England are so dependent upon the prosperity of that section, handicapped as it is by double transportation, since it is devoid of raw materials, markets, food, and fuel, that it must aid in reducing transportation costs to their lowest terms or its skilled labor must go elsewhere to compete, that its full accord should be forthcoming. With the Interstate Commerce Commission to regulate rates, guided to an appropriate extent by costs of independent, competitive water borne freights, it would seem wise to let every railroad and trolley in New England be combined as closely as possible, divorcing them absolutely from direct or indirect control of water lines, and retaining in the hands of the public the facilities for transferring freight from water to rail.

With this arrangement the railroad and people should prosper.

Very respectfully,

CASSIUS E. GILLETTE.

**APPENDIX D**  
  
ENGINEERING REPORT  
  
TO THE  
  
HONORABLE MAYOR AND THE HARBOR COMMISSION  
  
ON THE  
  
PROPOSED TERMINAL DEVELOPMENT  
  
OF THE  
  
PORT OF NEW HAVEN, CONNECTICUT  
  
By H. McL. HARDING, *Consulting Engineer*

LOCATION

It is the purpose of this report to provide plans and designs for the initial and for the future development of port terminals at the harbor of New Haven, Conn.

New Haven Harbor is about 4 miles in length and 1 to 4 miles in width.

The protected harbor consists of the shore in a curve about the bay extending from Fort Hale Park on the East to Sandy Point on the West and South; also the West, Mill and Quinnipiac Rivers with improved lengths of 1 mile, 1.3 miles and 1.9 miles. Mill River is navigable for about 2 miles from its mouth, the Quinnipiac for about 8 miles, and the West for about 2 miles. The main channel in the harbor has a length of 4.2 miles with a present nominal depth of twenty feet.

RAILROAD

New Haven is the most important center of the entire New York, New Haven and Hartford Railway System, having railway connections to the east, northeast, north, northwest and west.

COMMERCE OF THE PORT

In the calendar year 1913, being a normal year before the war, according to the commercial statistics prepared by the United States Army Engineers, the waterborne commerce at the Port of New Haven amounted to 2,096,135 tons valued at \$123,093,133.

Most of this trade is domestic and consists of receipts.

During the year ending November 30, 1920, there were transferred over the wharves of the New York, New Haven and Hartford Railway Company alone 523,618 tons, while about 18,000,000 tons, being largely miscellaneous freight, were transferred by rail through New Haven.

Of the 523,618 tons, 364,162 tons were coal and sand and the balance miscellaneous cargoes. The general cargoes, though of less tonnage, may be estimated as worth five times the coal and sand and would require at least double the area for transferring and handling.

#### EXTENT AND OWNERSHIP

The total length of waterfront at present in use or available for use in New Haven Harbor is about 7 miles.

Of the total frontage now available at New Haven 17,020 feet are on the main harbor, 7,050 feet on West River, 7,690 feet on the Quinnipiac River and 4,440 feet on Mill River.

The main channel depth at mean low water is 20 feet, though the slips are as a rule dredged to a depth of only 12 feet to 18 feet.

Of the total harbor frontage about 40 per cent, chiefly in the main harbor, is owned by or controlled by the New York, New Haven and Hartford Railroad. The city of New Haven owns only 540 feet of improved frontage. Practically all of the remainder is owned by private individuals and corporations.

The city of New Haven owns one terminal about 370 feet long and 80 feet wide, with an available depth along one side of about 15 feet at mean low water. The New York, New Haven and Hartford Railroad has six piers, known as Belle Dock, Middle Dock, Pocket Dock, Heaton's Wharf, Canal Wharf and Steamboat Dock, a total of about 12,000 feet but none of sufficient depth for large vessels. Present construction is mostly of pile and timber construction in general in poor condition.

#### PORT ADMINISTRATION

There are no port authorities other than a harbor master and a State Board of Harbor Commissioners. The harbor master is appointed by the Governor for a term of three years and performs the usual duties of that office.

The State Board of Harbor Commissioners for New Haven Harbor consists of six members, appointed by the Governor for a term of five years, without compensation except the clerk. The power of this board is expressly limited to the "general care and supervision of New Haven Harbor and its



tidewaters and of all the flats and lands flowed thereby in order to prevent and remove unauthorized encroachments and causes of every kind which are liable to interfere with the full navigation of said harbor or in any way injure its channels or cause any reduction of its tidewaters."

In addition to these officials there is another State Board called the Connecticut Rivers, Harbors and Bridges Commission. The principal purpose of this board, which is also appointed by the Governor, is to report on the condition of the rivers and harbors of the State and make recommendations for the improvements thereof.

It was this Board, augmented by the Governor and the Mayor of New London, that had charge of the new State pier at New London. A State pier at New Haven in construction, maintenance and operation would be in the hands of this State Board. A city pier would be in charge of the City of New Haven.

#### HARBOR DUES

There are no direct harbor dues collected at New Haven.

The rates for dockage, wharfage and handling have been very low.

Pilots are not generally taken except for foreign and United States registered vessels drawing 9 feet and over if spoken.

Towage has been increased.

#### IMMEDIATE IMPROVEMENTS

As to the initial development, the plans are such that the construction work can be started immediately at one location and be continued to completion without the necessity of purchasing any land or interfering with the industries.

The inauguration of this work will not be prohibitory on account of financial considerations as the unit system (as explained later) is recommended, or subject to delays due to physical reasons or to legal objections. The initial developments are also part of the comprehensive plan and need not be changed in the future but will form a portion of the whole unified system.

#### COMPREHENSIVE PLAN

For the development during the future years there is this comprehensive plan which may be followed as a guide, as the demands of water-borne commerce require additional construction.

## FUTURE IMPROVEMENTS

In accordance with this general comprehensive plan, all future piers, quays, slips, approaches and structures, sheds or warehouses may conform to this plan in the same way as streets conform to a previously approved city street plan.

## PAST HISTORY

In the past, as no such general plan was then possible, there was created the irregular and confused medley of long and short piers and narrow slips laid out at various angles, with approaches difficult of access and inefficient.

By good fortune and chiefly on account of the most excellent and commodious harbor and frontage, nothing has been done in the past which will interfere with the best development in the future.

These proposed terminals, while adapted to local physical conditions, are designed in accordance with the best and latest terminal engineering principles, which principles are based upon the daily operation and experience of the best ports of the world.

## PIERHEAD AND BULKHEAD LINES

It is generally better to determine for the future development, first the pierhead lines. From their location can be determined the bulkhead lines, the plan of the marginal way, the piers, slips, the railway tracks, the sheds and warehouses.

As to the significance of the location of the pierhead and bulkhead lines, it should be known that it grants no rights to land and adds nothing to taxation of the abutting property owners.

## SIGNIFICANCE OF HARBOR LINES

The pierhead and bulkhead lines are merely imaginary lines beyond which the Federal Government says that no pierheads must be extended. This is all that the locating of these lines means.

The State or the City can reserve to itself all rights it now possesses as to lands under water and within these lines.

The above is thus stated to correct a wrong impression that by establishing these lines certain rights or grants are given.

Permits for construction can be obtained by the City of New Haven from the Federal Government while awaiting the locating of the final pierhead and bulkhead lines.

The bulkhead line or quay line is the one parallel to the shore and limits the area which can be solidly filled.

The pierhead line is the line beyond which the piers projecting from the shore cannot be extended.

At certain places where there is not a great width of fairway the bulkhead and pierhead lines are identical. This is the case westerly from Forbes Avenue to City Wharf where, as piers would either extend into the channel or else slips must be cut into the land, it seemed best to combine the pierhead and bulkhead lines.

### WATERSIDE PARK

At the easterly end of this quay frontage is the bridge approach of a length of 300 feet and at the westerly end it is desired not to interfere with the view from the Waterside Park.

### SHED ROOFS FOR RECREATION AREAS

Here it is sufficient to say that in the plans, the legitimate uses of the parks for recreation purposes have been carefully protected, and it is hoped that the roofs of the transit sheds and of the future warehouses may be utilized for recreation.

Directly to the west of Waterside Park is an irregular piece of ground owned by the City and here is a slip extending towards Brewery Street.

In the easterly side of this slip will be a location for a selective initial terminal unit, as shown on the general comprehensive plan and on the initial plan D. W. G. No. 2.

### THE PLAN AND DESIGN

The Plans and Designs for the Port Terminals of the City of New Haven comprise four (4) large sheets, a general comprehensive plan for the future development of the whole waterfront, designated General Plan D. W. G. No. 1, and plans and designs for the selective development of three locations designated Initial Development Plan D. W. G. No. 2, 3 and 4, respectively.

### COMPREHENSIVE

The General Comprehensive Plan indicates how the whole waterfront of 7 miles may be improved, to which general plan all future construction may conform. Such a general plan is necessarily flexible, and subject to such modifications as commerce may require.

It is not designed to interfere with any industries, but rather to foster and encourage such.



### PROVISIONS FOR THE FUTURE

The general plan makes provision so that in the future there may be established all terminal facilities and works such as are essential to a successful competitive port. These will consist of permanent concrete quays and piers, steel sheds, concrete warehouses, manufacturing lofts, mechanical appliances, rail connections and approaches, car and dray storage yards and car placement tracks, drayways and approaches, terminal markets, cold storage plants, viaducts over roads and railway tracks where necessary, a broad marginal way, dry docks and marine railways, oil supply tanks for ships, coal pockets for bunkering ships and repair shops.

The dry dock is so located that it may be a slip for freighters when not in use as a dry dock.

The main harbor channel is to be dredged to 32 feet for ocean steamers.

### CHANNELS

While 30 feet depth of channel might be sufficient for most freight vessels, yet many will soon require 32 feet.

The channel from Long Island Sound divides eastwardly of Sandy Point, the main channel following the general direction of the old channel, the branch channel, 500 feet in width, passing in front of the pier line of the eastern shore. Both channels combine at the northerly end and their trend towards the West and South is about 500 feet from the pierhead line.

There are turning basins which also can be used for limited anchorage grounds suitably located as indicated on Map D. W. G. No. 1.

In the first development only the main channel of a width of 500 feet and a depth of 32 feet with the two turning basins as shown need be dredged.

It will probably require 50 or possibly 100 years to complete the whole program, but it is necessary to have such a plan looking to the future growth of the city and the port.

Finally, by the marginal way, boulevards and connecting roads, it will be possible to traverse the whole waterfrontage by car or dray from Fort Hale Park on the east to the extreme end of Sandy Point.

### QUAYS AND PIERS

In general, the sequence and progress of construction will be, first quays, second piers and finally double length piers. Quays cost much less to construct and afford a greater speed of operation.

After the construction of the quay and steel transit sheds, the warehouses may be erected.

### WAREHOUSES

On account of the great cost of warehouses, American cities have in most instances left the ownership of these for private initiative, but under the control of the port authorities as to rates and regulation.

An inspection of the plan and elevation of the large plan, D. W. G. No. 1 will indicate clearly the above works and facilities and their relative positions to the whole terminal and to each other.

The three (3) separate plans for initial development are located respectively on northern or central portion of the harbor, on the eastern and on the western section.

### OPTIONAL LOCATIONS

These are optional locations, either of which or all may be selected for initial development. The central location designated D. W. G. No. 2 is to the west of Waterside Park where land is owned by the City of New Haven. There are excellent approaches to this initial development location both by Chestnut and Hamilton Streets; also an easy rail connection with the New York, New Haven and Hartford Railway tracks, by tracks which can be laid at once but which later can be removed from Water Street when the other western units adjacent are installed. At this site will be provided a place for dumping the material which must be dredged from the slip or channel. There will therefore not be any cost for the filling.

By this initial development there will be no interference with the Waterside Park, the Starin Line, the property of Sargent & Co. or the New York, New Haven and Hartford Railway property or with any of the present or future developments.

The complete unit will comprise the two sheds, the open area and the warehouse with rail and dray approaches.

The substructure of this unit will be permanent, fireproof, decay resisting, and will require the lowest cost for maintenance.

### PERMANENT CONSTRUCTION

Any piles or wood structures of the relieving platform, as per the cross section of D. W. G. No. 2, will be below mean low water, and always saturated. Above this relieving platform to the level of the top of the wall the space is filled with the dredged material, paved with concrete and asphalt, in the

same way as streets are constructed. Within the width of about 40 feet to the rear of the edge of the quay wall, are placed railway tracks with the tops of the rails flush with the pavement for cars with outbound freight. This space is spanned by travelling external half-arch gantry jib cranes. To the rear of this space is the steel transit shed 200 feet long by 60 feet wide and 30 feet clear height beneath the roof trusses.

These sheds are equipped with internal overhead traveling cranes for cross transfer and for assorting, distributing and tiering.

To the rear of this shed will be tracks for inbound freight. Later there will be constructed a second shed similar to the first in construction and equipment.

These sheds will be of one story but more than equal in capacity to a two-story shed.

To the rear of these sheds on the property owned by the City will be the location of a six or more story concrete warehouse which can later be erected. The total height of this warehouse with the height of each story is shown on the cross section.

### INCOME INVESTMENT

This first installation will be able to earn and will earn a net income on the investment, thereby adding nothing to taxation and will not reduce the debt limit after the first year.

The City practically lends its credit during the construction period.

It is deemed advisable that there be more than one location submitted for the first development to obviate any criticism as to favoring any one section, so that if there should be any objection to utilizing what may be called the Chestnut Street Terminal, that there may be plans for others which may be selected.

### EAST SIDE LOCATION

On the east side of the harbor south of the Winchester Coal Quays, there is a location which may be considered as a favorable location as per the Initial Development Plan D. W. G. No. 3.

This also, according to the above drawing No. 3 will be at first a quay development, but which later can consist of a standard pier 700 feet long and 300 feet wide.

This quay unit would also have the same type of substructure and superstructure as at the Chestnut Street terminal, but the shed will have foundations upon which can be erected later



the many storied warehouses when the pier is constructed and the sheds are built upon the pier as indicated, and then this warehouse will be the supporting warehouse of the pier sheds.

This terminal, which will be designated as East Terminal No. 1, will have the same standard external and internal mechanical appliances and car track connections with the N. Y., N. H. & H. R. R. and also dray approaches as indicated on D. W. G. No. 3. This land, however, does not belong to the city but could probably be purchased at a reasonable price.

### CITY POINT LOCATION

It is most urgently recommended that the city start proceedings to acquire property south from the silk mill property to Fort Hale Park with a width as per the plans.

There is still a third location towards the west on land which must be filled. This could be filled from channel dredgings. The land which is under water is owned by the city. This land which may be thus utilized, is between the Bayside Park and the central portion of the harbor frontage, and will not interfere with the view seaward from the Bayside Park across the harbor.

The general direction of this terminal development would be northeast of the park.

This terminal development is shown on the plan designated D. W. G. No. 4 and is of the quay type of the same plan, structural design and equipment as already described in the other two plans for initial development. The first step of this development will be according to the solid lines on the plan, and the successive additions as per the dotted lines.

There will be most excellent road approaches and the railway track approach from the N. Y., N. H. & H. R. R. at first will be by a trestle as shown on the plan until such time as the plan as on the general comprehensive plan shall become operative. This trestle would be in the shallow water of the harbor in front of the New Rubber Mill.

The cost of the initial development at the various locations will be given in the section entitled estimates.

### INVESTMENT FOR THE THREE INITIAL DEVELOPMENTS

Of the relative investments for the three (3) selective locations, that for the Chestnut Street Terminal would be the least, for the East Side would be more and for the City Point Terminal on account of the railway approaches the investment would be the most. Possibly the railway might co-operate in building the trestle.

## GENERAL DETAILS OF CONSTRUCTION OF CHESTNUT ST.

## QUAY TERMINAL

The top of the permanent concrete gravity quay wall, will be two feet above the highest recorded flood tide. This wall will be of the relieving platform type.

The depth of water in this slip will be thirty-two feet.

First the shore will be dredged to a slope of 1 on 2 and into this slope will be driven piles in rows properly spaced for any reasonable load which it may be required to sustain. The transverse rows will have four feet centers. The tops of these piles are cut off at mean low water, and as they will always be saturated with water they will never decay.

From careful inspection, observation and inquiry there are now no toredo in the harbor waters.

Rip-rap with a slope of 1 on 1 will be placed between the piles. This is plainly shown in the cross section drawing on D. W. G. No. 2.

On the relieving platform behind the concrete wall will be filling which when settled will be paved with concrete coated with asphalt.

This paved area will have two railway tracks parallel to the quay wall spaced about thirteen feet centers, the first track center being seven feet from the front of transit sheds, the front walls of which are placed about fifty feet to the rear of the face of the quay wall.

There will be two steel sheds, one of which will be at first constructed parallel to the waterfront with 50 feet between them, each 200 feet long, 50 feet wide and of 30 feet height. To the rear of these sheds is a drayway 50 feet in width. There are also here located three lines of tracks and a location for the six-story warehouse, which should later be constructed as soon as funds are available.

To the rear of the warehouse would be a roadway and other railway tracks for the placement of a limited number of cars for the outbound and inbound freight. In close proximity to this quay terminal are storage tracks of the N. Y., N. H. & H. R. R. Co., and not remote is one of the largest railway yards in the United States belonging to the N. Y., N. H. & H. R. R. Co. All the tracks will be connected with the tracks of the connecting trunk line railroad.

The two tracks in front of the sheds, between the sheds and the quay wall, are spanned by electric travelling half-arch gantry jib cranes of one to two tons hoisting capacity. There will be stationary revolving jib cranes at suitable locations up to 50 tons capacity.

These cranes in combination with the winches on the ships



give the greatest possible speed in discharging and loading ocean and coastwise ships. With the harbor craft such as barges and lighters which are not equipped with power machinery, they are essential. Such cranes form part of every modern marine port. Within the sheds will be overhead cranes travelling at right angles to the length of the sheds for transverse movements and tiering.

Later there will be cranes for transferring freight between the sheds and the future warehouse.

The details of the substructure, the wall and the quay, the rails and the superstructure, such as the sheds and the machinery, will be more clearly understood from an inspection of the plans and elevations attached to and made a part of this report.

The initial development of a quay unit constitutes a complete terminal, fully equipped and capable of earning a net income above all expenses, thereby adding nothing to taxation.

#### DESCRIPTION OF THE GENERAL PLAN

On the easterly side of the harbor are planned ten piers. In the northerly section, including City Point, there are eleven piers and on the westerly side are six piers, making a total as shown of twenty-seven piers. In addition there are other locations where, if ever necessary, there can be other piers. Some of the piers are shown of double length or two units piers, although most all of the piers can be extended should commerce so demand. In addition, there are about 10,000 feet of harbor quay frontage besides the quays on the three rivers.

There could be berthed at the same time over 180 ships of 350 feet length and over fifty of 300 feet length besides many barges and lighters.

With sufficient depth of waters the largest ships afloat or any ships that will probably be built within the next hundred years will find ample berthing length at the New Haven piers and quays.

The distance measured around the quays and piers as designated would be about fourteen miles. Probably across the berthing frontage could be transferred over 20,000,000 of tons annually.

The above figures are given to indicate what great possibilities exist for the Port of New Haven.

#### PIER DIMENSIONS

The piers are 700 feet long and 300 feet wide and in width are equivalent to what are called double piers. The reasons for this pier width are the coming into general use of the five ton motor truck and trailers which for a distance of 40 mile



radius and possibly more has been found to give rapid and economical service. As is well known, these motor trucks and trailers require more room for operation than railway cars, and in this case, space must be provided both for the railway cars and for the motor trucks, which provision will require wider piers.

In addition, there is a probability in the future that the piers may be increased in length so as to have two berths on each side of each pier instead of one as now designed. A pier for the berthing of two ships on each side is wider than where there is only one. Such piers of double length, or 1400 feet, are called two-unit piers.

Provided there is sufficient water frontage, wider piers have the advantage in more rapid operation.

Where there is a limited water frontage, to obtain more ships' berths narrow piers are often recommended.

The distance between the pierhead and bulkhead lines is as indicated 700 feet. The pier width is 300 feet and the slips are also of the same width of 300 feet.

Vessels of not more than 300 feet in length can berth at the end of the piers and barges at the head of the slips.

Freight can be transferred by the cranes from vessels lying at the end of the piers to sheds, and from barges, lighters and small vessels across the head of the slips directly to the warehouses.

To the rear of the bulkhead is the marginal way which has a width of 300 feet.

Probably all these piers will not be constructed during the time of this generation, but it is necessary to have a plan to which future construction, be it more or less, should conform.

Beyond Bayview Park, still further towards the west, the construction is of the quay type. Here is planned the location for repair shops and the dry docks.

Sometime in the future it may be desirable to project piers from the point, but this is not probable for 20 years to come, therefore they are not indicated.

## PIERS

As the design of the initial development of the quay has been described, the design of the pier may be said to consist of two quay frontages placed back to back with the space between filled in with dredged material. A pier is therefore the same as a double quay.

## PIER DIMENSIONS

As stated, the pier is planned to be 300 feet in width in order that there may be a sufficient width for operating con-

ditions without congestion, and yet permit the piers being extended to a length of 1400 feet in the future. If the pier should be 160 to 180 feet in width and then doubled on length, there would be congestion, which is the great obstacle in obtaining the economical speed of operation.

### RAILWAY HOLDING TRACKS AND DRAY AREAS

It is necessary to have many railway tracks for temporary holding of full cars for export freight and for empty cars for import freight and also a large area for dray approaches and dray yards.

In general, it may be said that besides the discharging, loading switching tracks, there should be in the classification, receiving, shipping and temporary holding yards, not less than a minimum of two miles of railway track for each quay unit of 600 feet when a number of units have been installed.

The above length of trackage is based upon a study of the class of freight expected and on the principle that part of the ship's cargo will be transhipped over the ship's side, part immediately removed by the cars and drays, and a part, when assorted and distributed in the transit shed will be placed in the long storage warehouse.

As the New York and New Haven Railway will be the beneficiary of this rail haul traffic, it is for their advantage as well as for that of the terminal that their tracks and car storage facilities be extensively used in connection with the terminal development and that some of the tracks be provided by the railway company, but all of the terminal area should be under the control of the terminal operating company of the City or State.

### DRAY APPROACHES

The main dray approach to the Chestnut Street Terminal will be Chestnut Street, also Hamilton Street will be available for a through circuit.

As the quays and piers are extended to the West, there will be a marginal way for railway tracks and drayways. Along the water-front at a distance behind the bulkhead line will be a boulevard and a marginal way to City Point, and around the point to Kimberly Avenue. Sometime it may be necessary to have certain north and south streets extending over the existing east and west railway tracks to connect with the water-front.

### LOADING AND UNLOADING RAILWAY TRACKS

Along the quay, between the shed and the water's edge,

which is a distance of about fifty feet, will be three (3) railway tracks, of which the center track will be for a switching track with cross-overs to the other two tracks, one such track at about every one hundred and fifty feet.

These front tracks are chiefly for outbound freight, which will be swung by the cranes from the open or closed cars directly to the ship's hatchways or upon barges or the shed. These tracks can also be used for inbound freight when it is not to be distributed or assorted.

To the rear of the shed, and between the shed and the future warehouse will be three (3) more railway tracks of which the center is also a switching track.

These tracks are chiefly for inbound freight from the shed to the cars after it has been assorted in the shed for the cars to further points inland. Some of this inbound freight may be for further shipment by vessels, and will, after assorting according to the marks, be swung from the shed to those other vessels.

#### EXTENT OF TRAFFIC

This transshipment barge traffic will extend from the port of New Haven both to the east and to the west; to the west in a direct route by the Long Island Sound and the Harlem River to the Hudson River and to New York up-state waterways, as the Barge Canal via the Hudson River.

The railway transfer freight will also extend to the State of Maine, the Canadas and northern New York State, including New Hampshire, Vermont, Massachusetts and all of Connecticut. There is no doubt that portions of the outbound as well as the inbound cargoes will bear the marks of Quebec, Montreal, Kingston and Toronto.

#### DRAYWAYS AND AREAS

Besides the street approaches, there will be drayways between the sheds and the edge of the quays and behind the sheds.

The top of the rails of the railway tracks within these spaces will be flush with the pavement so as not to interfere with dray passage, the same as with street railway tracks in public streets.

It is estimated that there should be dray-waiting space areas approximating in all not less than 2,400 square feet for each 600 feet quay unit. This is based upon the proportion of local freight tonnage to the whole.



### SUPPORTING RAILWAY TRACKS FOR THE PIERS

In connection with the proposed waterfront freight tracks of the N. Y., N. H. & H. R. R. Co., it is estimated that to the rear of the piers along the central waterfront between the marginal way and the present shore there will be sufficient area for the supporting railway storage tracks for the total berthing frontage as drawn on the plans. There will not, however, be an excess of trackage, especially when the drayage area is considered.

The N. Y., N. H. & H. R. R. Co. has, however, a large area to the east of East Rock which could be used as a supply reservoir for cars which can be used in connection with the whole waterfront development.

The railway tracks, drayways and the marginal way with suitable outlets and inlets and approaches and viaducts will, as indicated in the comprehensive plan, finally surround the whole waterfront from Fort Hale Park to West Haven with branches up the Quinnipiac, Mill and West Rivers.

### PIERS AND APPROACHES

Railway tracks, on the piers, are designed to give access and egress either to the right or left, or to warehouses, or to the tracks in front of or to the rear of the warehouses. There are also railway tracks along the sides of the piers and between the sheds on the piers and also ample drayways.

All of the tracks, crossovers and frogs will not be constructed, but it is necessary to indicate the possibility of their layout.

There are four sheds on each pier with open areas for bulk or coarse freight. As already stated, the pier is equivalent to two quays set back to back but with the warehouse set fifty feet to the rear of the bulkhead line.

### REPAIR YARDS, SHOPS AND DRY DOCKS

Besides the piers and quays, channels, anchorages, sheds, warehouses, mechanical appliances, railway tracks, highways, approaches, coaling equipment, oil supply tanks and other port works, there should be adequate facilities for the maintenance and rehabilitation of the commerce carriers arriving at its waterfront to discharge and load freight.

Many functions which have a great influence on the commercial success of a port have been left to private enterprise, but when private enterprise has failed, the ports have had to continue without these necessary facilities. Among these may be mentioned repair shops and yards, marine railways and dry

docks. Such facilities and others need not be part of the initial installation, but there should be reserved locations for these future installations. There should, however, be an easy access to the railway tracks. All conditions and locations having been studied, the area to the west, on the peninsula known as the City Point, seems to be the most suitable. There are here large areas, possibility of economical construction, and there can be excellent rail connections, and the place is not remote from the waterfront terminals.

### POWERS, LAWS AND ADMINISTRATION

It is generally advisable to profit by the experience of others; to avoid their errors, both little mistakes and great failures, to learn from them what were the paths followed to achieve success, what were their rules and principles, that is, to study their history. Not only is this true of individuals and industries, but it is especially true of cities in their striving to be superior to competing cities in port terminal facilities. There is no time so favorable to have an administration model to follow, as at the inception of port development.

It seemed best in this report to include the laws of administration of two cities with terminal rates, rules and regulations and refer to a few of their salient features. Such an administration by the City should be the final purpose even though at the beginning there be a combined City and State Administration.

The first, made a part of this report, is Chapter 289, Laws of Wisconsin, 1919, by which legislative enactment, authority is granted to the City of Milwaukee to create a Board of Harbor Commissioners with power to plan harbor and waterway improvement and to provide for the construction of docks, wharves, warehouses, subject to the approval of the civic authorities.

The law also gives such board exclusive control over all terminals, including all railway tracks and belt railways connected therewith, belonging to the City, with power to fix and regulate charges for the use of publicly-owned conveniences of the port. The board is also empowered to make use of any funds provided by the city for harbor improvements, repairing docks and doing necessary dredging. These laws in this city have been approved by the City Council.

It is most strongly recommended that these laws be adapted to the legal conditions of the Port of New Haven and adopted almost in their entirety except insofar that the Charter of the City of Beaumont, Texas, of May, 1919, may appear superior. There have been submitted and made a part of this report the above mentioned laws and also that portion of the charter of

the City of Beaumont and the rules and regulations of the City Council of the City of Beaumont which refer to Port Administration and Management.

It would be preferable, subject to the State of Connecticut, to operate under the Milwaukee laws for a year or two and then change over to the Liverpool and English Colonies-system as exemplified in the Charter of the City of Beaumont.

The first step would be to appoint a board of at least five harbor commissioners. These can be appointed by the Mayor. Your consulting engineer would be pleased to explain more fully to your Committee.

### MECHANICAL APPLIANCES

One of the chief features of the success of marine terminals is speed of discharging and loading ships.

From speed comes economy, and from the combination of speed and economy the port becomes most desirable to the shipper and consignee and secures for itself a most enviable position as a competing port on account of the least delay of the ships.

To secure this speed, there must be no congestion points, from the time the freight leaves the ship until it is outside the terminal limits, and similarly there can be no congestion delays for the freight in its course from the limits of the terminals to its final place in the ship.

The only way that this speed of discharging and loading can be obtained is by the utilization of power appliances.

The machinery at the terminals will consist of appliances of such universal adaptation that they will transfer and handle goods and commodities of every kind and description. The terminals are for the public who deal in every class of merchandise.

Special commodities, as at private terminals may require special machinery, only applicable to the particular class of goods or material.

At public terminals for miscellaneous cargoes there may be installed machinery of the crane type, external, for transferring between vessel and shore, and internal for further shore movements and handling.

The external crane is of the full or half arch electric travelling, revolving, gantry jib type of 1 ton capacity with one rope and 2 tons capacity with two ropes.

The speed of hoisting with full load is from 250 to 300 feet per minute with one rope and 150 feet per minute with two ropes.



The speed of travel along the quay is about 250 feet per minute.

There is one crane on the quay for each 150 to 300 feet.

### TRAVELLING REVOLVING GANTRY JIB CRANES

These cranes are chiefly for transferring between vessel and shore; for outbound freight from the land carrier or shed to the vessel and inbound freight from the vessel to the land carrier or to the shed.

### SHIPS WINCHES

In discharging, by using the ships winches to draw from between decks to above the upper deck of the ship and then burtoning to the hook of the full rope of the crane, the greatest speed is secured. Further shore movement is by the internal overhead travelling cranes over movable cross tracks and fixed side tracks. There are other accessories, such as nets, slings, hooks, motor tractors and trailers which can be added from time to time as the demand occurs.

### THE HARBOR

The harbor waters are not now of sufficient depth for ocean freighters. The depth varies from 14 feet to 20 feet.

It is recommended that there be a channel of a depth of 32 feet at mean low water, and with a width of about 500 to 600 feet dredged from the Sound to the proposed location of the first unit and as shown on the map of the large comprehensive plan D. W. G. No. 1 around the whole harbor, the width of the channel being also 500 feet. Turning basins and anchorages are drawn on the plan.

The channel at first is only to be dredged where designated as the Main Channel with the anchorages. Later the channels can be dredged opposite the piers and quays as they are there constructed.

The first Main Channel is in accordance with the policy of the installation of the first terminal units, but there should only be such improvements and investments made for which there will be an immediate commercial use. A petition should be made for this main channel improvement with basins at the earliest possible date in accordance with the following method of procedure for obtaining appropriations for harbor work by the Government.

First Congress authorizes a preliminary report and survey. Under this authority the district United States Engineer formulates a report and recommendation with the cost estimates

to the Secretary of War. This report first goes to the Division Army Engineer for his approval or disapproval, who then forwards it to the Chief of Engineers in the War Department in Washington and the Chief of Engineers sends it to the Board of Engineers for Rivers and Harbors for their action. They give notice as to the nature of the District Engineer's report, and anyone who wishes to submit further arguments on any of the projects which the District Engineer reports adversely is permitted to do so. After the Board of Engineers for Rivers and Harbors passes on the report, it goes again to the Chief of Engineers for his approval and is then sent by the Secretary of War to Congress for action as to appropriations or other recommendations. There is no doubt but that when the City of New Haven starts construction on its first unit that favorable action as to dredging the channels will be taken by the Federal Government.

### DRAYS AND TRAILERS

Transportation by the five-ton motor truck and trailers whereby loads can be transported between the factory and the ships has now become such an important factor in the movements of goods for a radius of thirty miles that the terminal design has been modified to suit the changed conditions. These modifications largely consist in allowing greater areas for dray or motor truck yards.

Raw material can be delivered to the dray for immediate transport to the factories, manufactured products from the factories to the ships for export. Food products can also be delivered from the barges or vessel to the merchant or consumer. Barge or lighter traffic about the harbor will greatly increase.

### UNDERLYING PRINCIPLES OF OPERATION

Unless the methods of freight-transference-operation are fully understood, the reasons for the plans, designs, relative locations of the structures, the installation of machinery may not be fully comprehended. It seemed advisable therefore to describe in detail the inbound movement of the freight from the vessel until it leaves the terminal and the outbound from the time it enters the terminal until it is finally loaded into the vessel.

### OPERATING METHODS

The following details of operation are in accordance with the best and latest terminal principles, which are based upon the daily practice of the most successful ports and have re-



ceived the commendation of the Society of Terminal Engineers.

### ATTAINMENT OF SPEED AND OPERATION

To secure the greatest speed in the freight movements, the design should be such that there will be a continuous course of the goods through all portions of the terminal, both inbound and outbound, the same to be performed by machinery such as cranes, tractors with trailers and accessories but with the minimum of hand labor.

Unless the plans and the designs are such that correct mechanical appliances can be adopted, installed and successfully operated, the speed which is so essential to making the Port of New Haven the chief port of Connecticut and of New England cannot be obtained. For this purpose to avoid interruption the indestructible and non-decaying quay walls with an ample factor of safety in the sustaining piles were adopted, the permanent, concreted paved and asphalted quay surface having the least possible wear was selected, and fireproof steel sheds with rigid, immovable columns and trusses for supporting cranes and hoisting mechanisms are to be installed; all to form a complete and harmonious whole for continuous operations of the machinery already described under the head of Mechanical Appliances with the minimum of congestion.

The vessel, ship, barge, lighter or other harbor craft arrives at the quay with a cargo of miscellaneous freight.

### INBOUND FREIGHT

This inbound freight of ocean ships for the most part is between decks and must be drawn to the hatchways of the ship for the vertical hoisting. This first horizontal and vertical movement of discharging is best performed by the ship's winches, and the draft when above the upper deck instead of being burtoned to the fall rope of a second boom, is burtoned to the hook of the fall rope of the revolving jib of the traveling gantry crane, and swung to the shed for assorting, distributing and tiering, or if of few marks, either to waiting cars to possibly drays for the secondary movement.

After being assorted and segregated in the shed, the freight is moved to outgoing cars, to the drays of the consignees or placed in warehouses for storage. The movement from the shed to cars, drays or warehouses is at the expense of the consignee or shipper as well as the storage charges of the warehouses. Overhead cross travelling cranes with movable tracks distribute the freight within the shed and then transfer to the outgoing freight cars or to the warehouse. Inbound bulk and



coarse freight, not affected by the weather, is generally placed in the open areas at the ends of the sheds but not between the sheds and the water edge of the quay.

There will be many lighters and barges operating about the harbors which will not have winches. Their loads will be lifted directly from their holds or decks, and swung upon the quays or cars or to the sheds by means of these travelling jib cranes.

These barges and lighters may be termed water drays but often of 500 tons capacity in contra-distinction to land drays of 5 tons capacity, and the operation of these harbor craft will form a new and important industry. It has been said that there are 10,000 such vessels around New York harbor, and before the war that some 50,000 barges called at Hamburg annually.

From the time the freight leaves the ship, barge or lighter to its final movement within the terminal, to secure speed of movements there must be no congestion points, especially at points of deposition when being transferred from one movement to another. All movements should be continuous.

### OUTBOUND FREIGHT

The outbound freight for water shipment will come in railroad cars, closed or open, in drays or on barges, lighters, schooners or other vessels for trans-shipment.

From the outbound cars the freight is not assorted but is generally transferred directly into vessels, if there be a vessel waiting.

From open cars or from within the doors of box cars freight is transferred by the gantry jib cranes to the hatchways of the outgoing ships.

Should the car freight arrive and no vessel be ready, if there is to be more than 48 to 72 hours delay, the freight is stored in the warehouse. For a very short period it may be held in the detained cars to avoid rehandling. In general it is advisable to notify the shipper as to the arrival of the vessel and when it will be ready to receive the freight, to avoid car demurrage or the ship's delay.

Often it is necessary to hold freight in the warehouse until full cargoes are secured. It is here that the superior ability of the traffic manager made manifest. Often the dray and barge outbound freight, originates sufficiently near so that it need not be detained at the terminal, but can pass directly into the ship.

From nearby works, factories and shipping points located upon the waterside, barges and lighters can bring the out-

bound freight directly to the ship's side, or inbound freight can be taken from the ship to such locations.

### ESTIMATES

The following estimate applies to the initial development at the site lying westerly of Waterside Park.

This terminal will have a frontage length as per the plan drawing D. W. G. No. 2, lying parallel to the southwesterly line of Waterside Park, and with a standard width of about 150 feet.

The substructures below mean low water will consist of piles driven to refusal, with a slope dredged to 1 on 2, with the slope between the piles covered with rip-rap deposited to a slope of 1 on 1. Above the piles are the transverse timbers 12" X 12", the relieving platform, 4 inch plank, the toe, key and tail pieces, each 12" X 12", and to the rear the curtain wall.

Upon this relieving platform towards the front is the permanent concrete wall of the mass gravity type protected by fender piles and chocks. The space to the rear of the wall will be filled with material dredged from the slip, concreted with 5" of concrete and coated with 1½" asphalt.

#### INITIAL OPTIONAL DEVELOPMENT No. 1

The estimate for this substructure, the dredging, filling behind the wall with the dredged material, the paving and the terminal railway tracks, all as per plan, will be.....	\$108,000.00
The estimate for the steel shed 200 feet by 60 feet and accessories .....	43,200.00
Gantry cranes, overhead tiering and distributing machinery .....	34,000.00
Incidentals and engineering .....	12,300.00
Total .....	<u>\$197,500.00</u>

The above figures may be accepted as conservative and, as costs of labor and material are falling, the final figures when bids are requested will probably be less.

It is expected that the dredging in the channel and in the turning basin will be done by the Federal Government. This channel, 500 feet wide and 32 feet deep, with the turning basin is indicated on the General Comprehensive Plan D. W. G. No. 1. The dredging in the slip of sufficient width to the length of the quay has been included in the estimate of \$197,500.



### INITIAL DEVELOPMENT

On the Initial Development Plan D. W. G. No. 2 are shown the dimensions as the length and the width of the quay. On the same drawing are given in the cross section, the heights and other dimensions.

The estimate of the cost of the initial development on the east side of the harbor for similar construction would be \$198,750.

To this, however, should be added the purchase price of the land, the carting of rip-rap, and the railway tracks and roads as may be laid out by the City.

The cost of the land for the terminal site and along the foreshore should be obtained at an early date.

It is, however, recommended that all the land as shown in the General Comprehensive Plan D. W. G. No. 1 as developed for terminals on the east side be acquired by the City. The initial development of this east side terminal is as per plan drawing D. W. G. No. 3.

This, as has been demonstrated by the experience of other cities, will be an excellent investment for the City, and there are plans for financing such lands. If sufficient land is purchased, the increase in the value of the land will more than pay for the terminal development.

### INITIAL OPTIONAL DEVELOPMENT No. 3

On the northeast side of City Point, where filled-in land would be owned by the City, is a proposed site for the third optional initial development, designated as Initial Development Plan D. W. G. No. 3.

The investment here on account of additional dredging and filling and the trestle approaches would be more than at the other locations. This is estimated to be about \$245,000, exclusive of the trestles, rail approaches and water rights.

It is to be understood that the above estimates are based upon normal conditions and that there is no rock to be excavated and no economic objections.

When working drawings are prepared for actual construction, then borings will be made and all conditions will be carefully worked out in detail.

While it should be of little value to give estimates of installations which may not be made for a number of years, yet a few unit estimates may be of service as an approximate guide.

For quay construction, exclusive of dredging, filling, railway tracks and roadways, which will vary for each location,



the estimated cost today may be taken as \$130,000 per linear foot frontage. That is, the cost of 600 linear feet would therefore be \$78,000.

The estimated cost of a pier 700 feet long, 300 feet wide, with a slip head of 300 feet would be \$275,000.

The sheds, 60 feet  $\times$  200 feet, one story, would cost from \$30,000 to \$50,000.

The average cost of a warehouse 100 feet  $\times$  200 feet, six stories, would be about \$500,000.

To these general figures must be added the purchase price of land, railway tracks, roads and various accessories.

The general specifications contained in this report will indicate clearly the types of construction recommended.

When, however, the construction work of the piers, quays, sheds or warehouses is to be started, then there should be exact working drawings and exact estimates made, based upon the prevailing prices of labor and material at that time.

The initial development at the terminal, east of Waterside Park, will be less than \$200,000.

It is necessary to make a start, if the assistance of the Federal Government is to be secured.

The following significant sentences are quoted from one of the Federal Government reports about New Haven and are self-explanatory of the attitude and position of the authorities at Washington. Referring to Municipal Terminals at the Port of New Haven, it says:

"Engineers were engaged to investigate the matter and a report containing a comprehensive study of the terminal situation has been made, but no definite action has yet been taken on the project," 1916.

These old reports and records are brought before the Secretary of War and the Chief Engineer of the War Department, when any new appropriations are asked for the improvement of the harbor of New Haven.

A new Secretary of War is soon to be appointed who is free from any old bias. The new Chief of Engineers will be favorable if the City does its part.

That the City has had modern plans, general and specific, just finished, will have its influence in securing a most favorable hearing and prompt action.

Your consulting engineer will assist, if desired, in presenting this matter before the Chief Engineer of the War Department.

From time to time addenda will supplement this report.

Respectfully submitted,

H. McL. HARDING,

*Consulting Engineer.*











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